A Spatial Analysis of Kansas Farm Ponds

Regression Modeling and Outlier Detection

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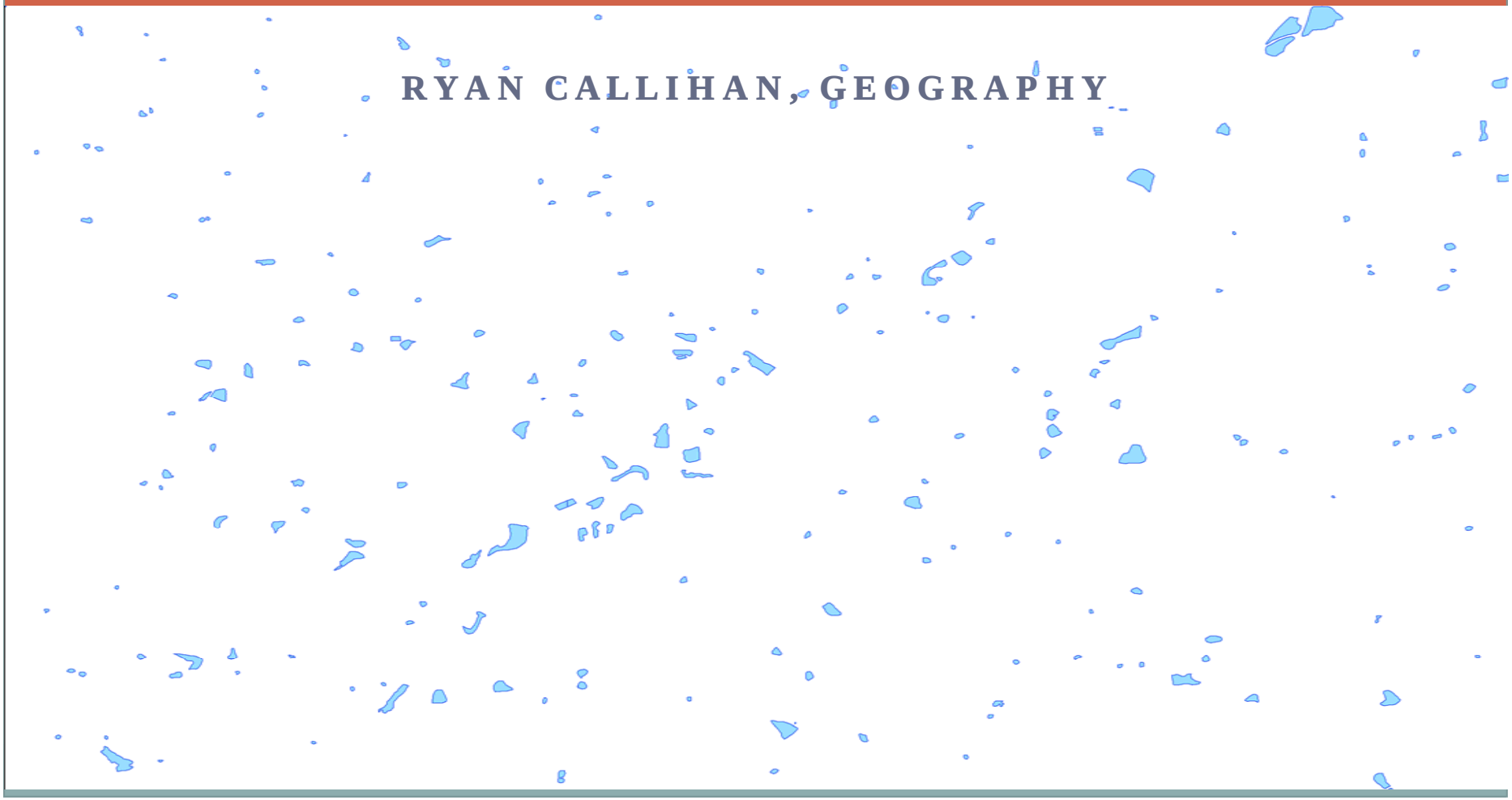
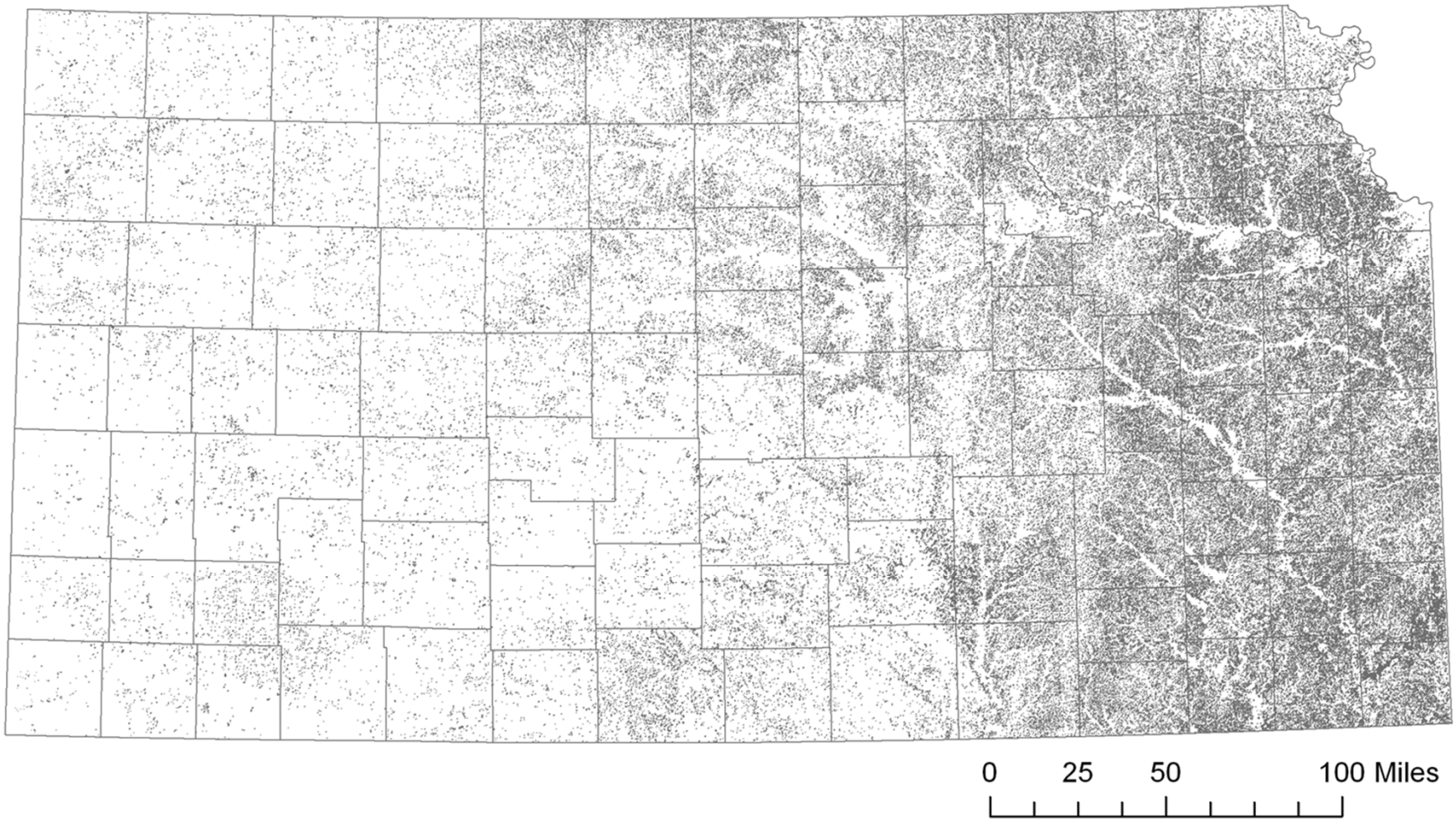


Small Reservoirs (<10 acres) in Kansas



Count: 216,000

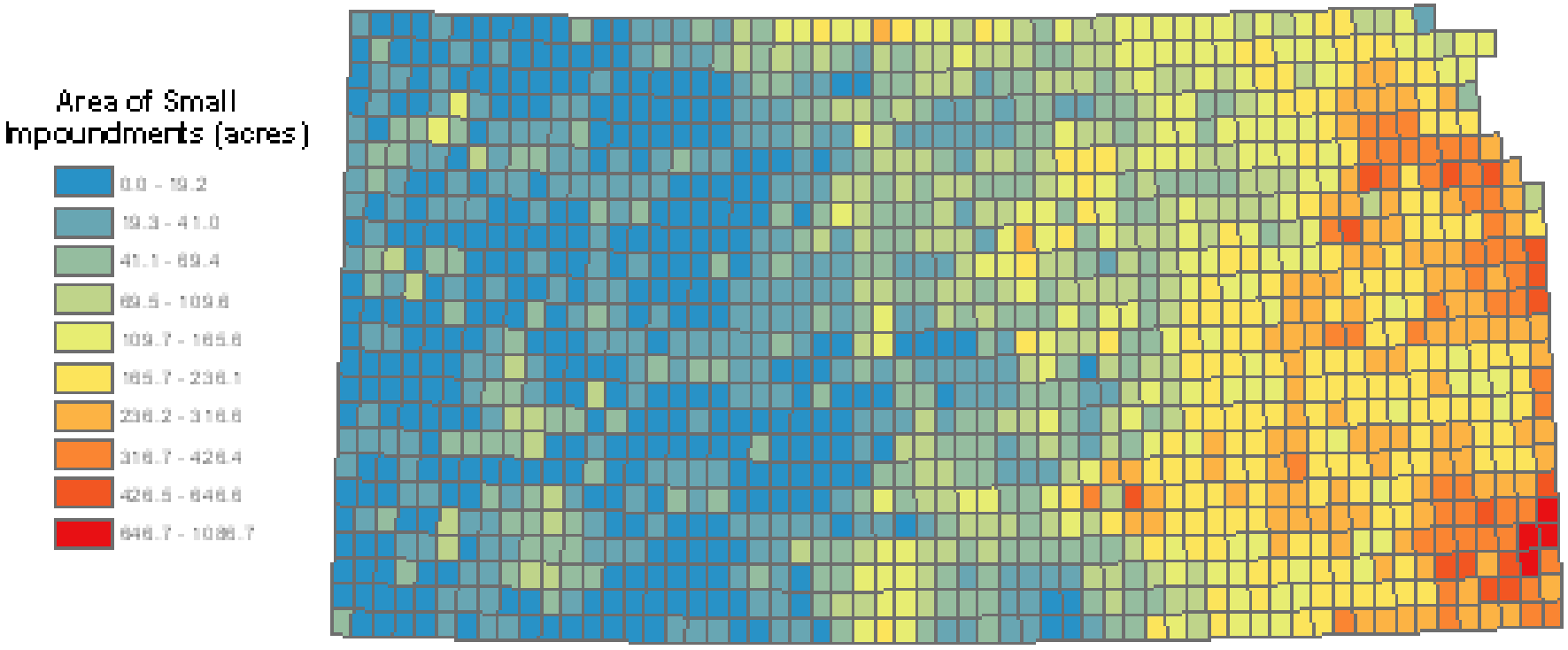
Total Surface Area: 140,000 acres

Two Main Objectives

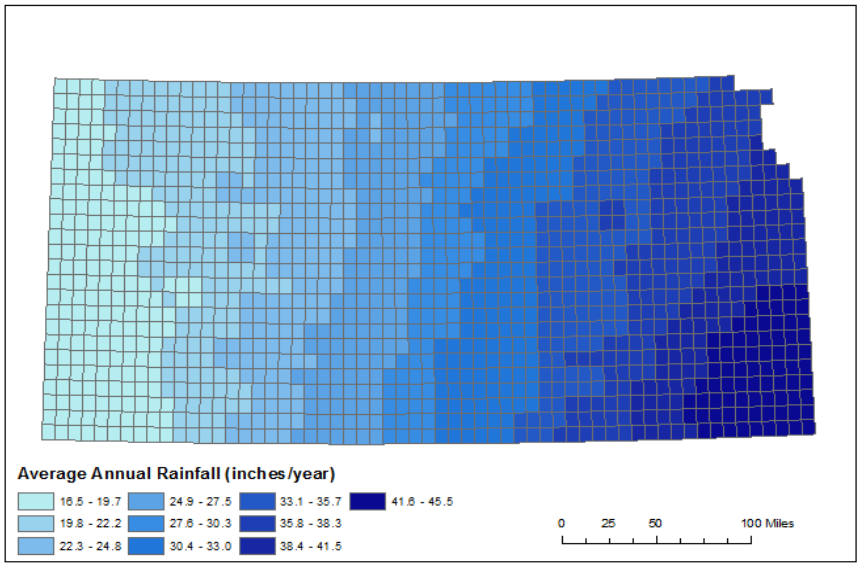
- **Create a simple geographic weighted regression model** based on annual rain fall, cropland, and population to predict the distribution of small reservoirs.

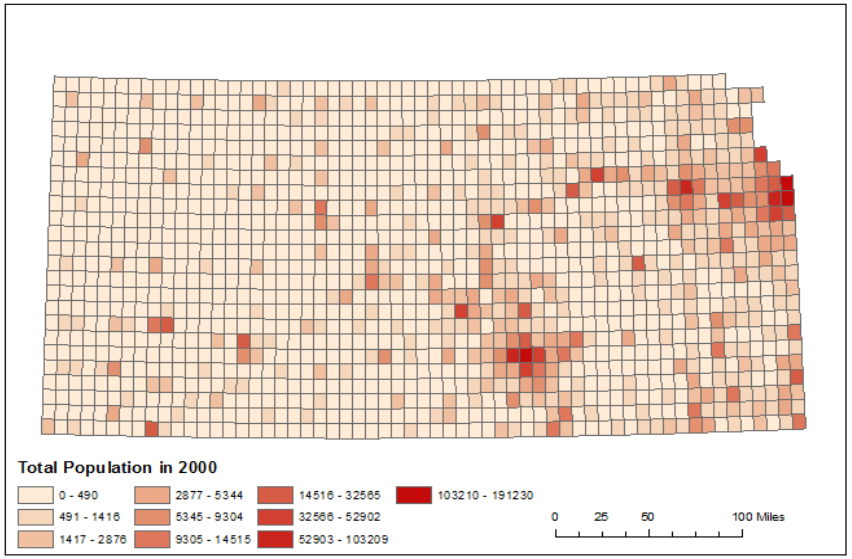
- **Map and identify outlier regions** where the model grossly overestimated or underestimated the concentration of ponds.

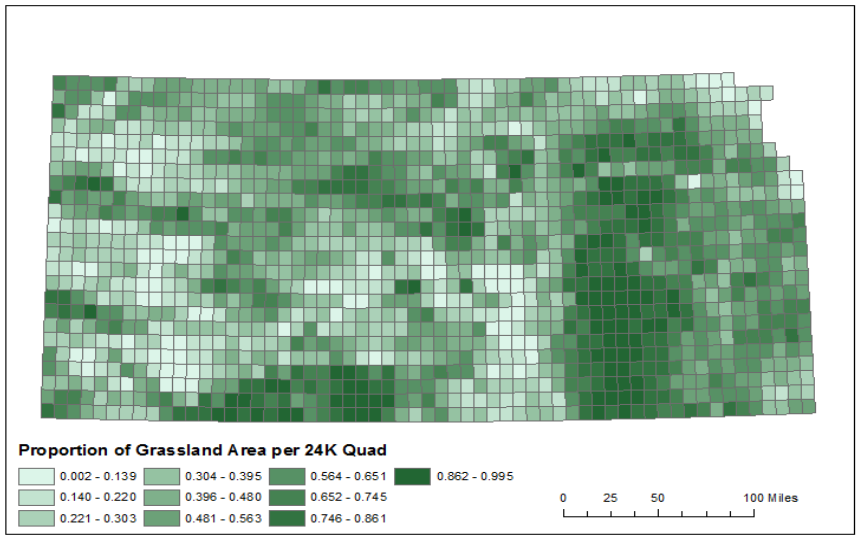
Surface Area of Small Reservoirs per 1:24k Quad



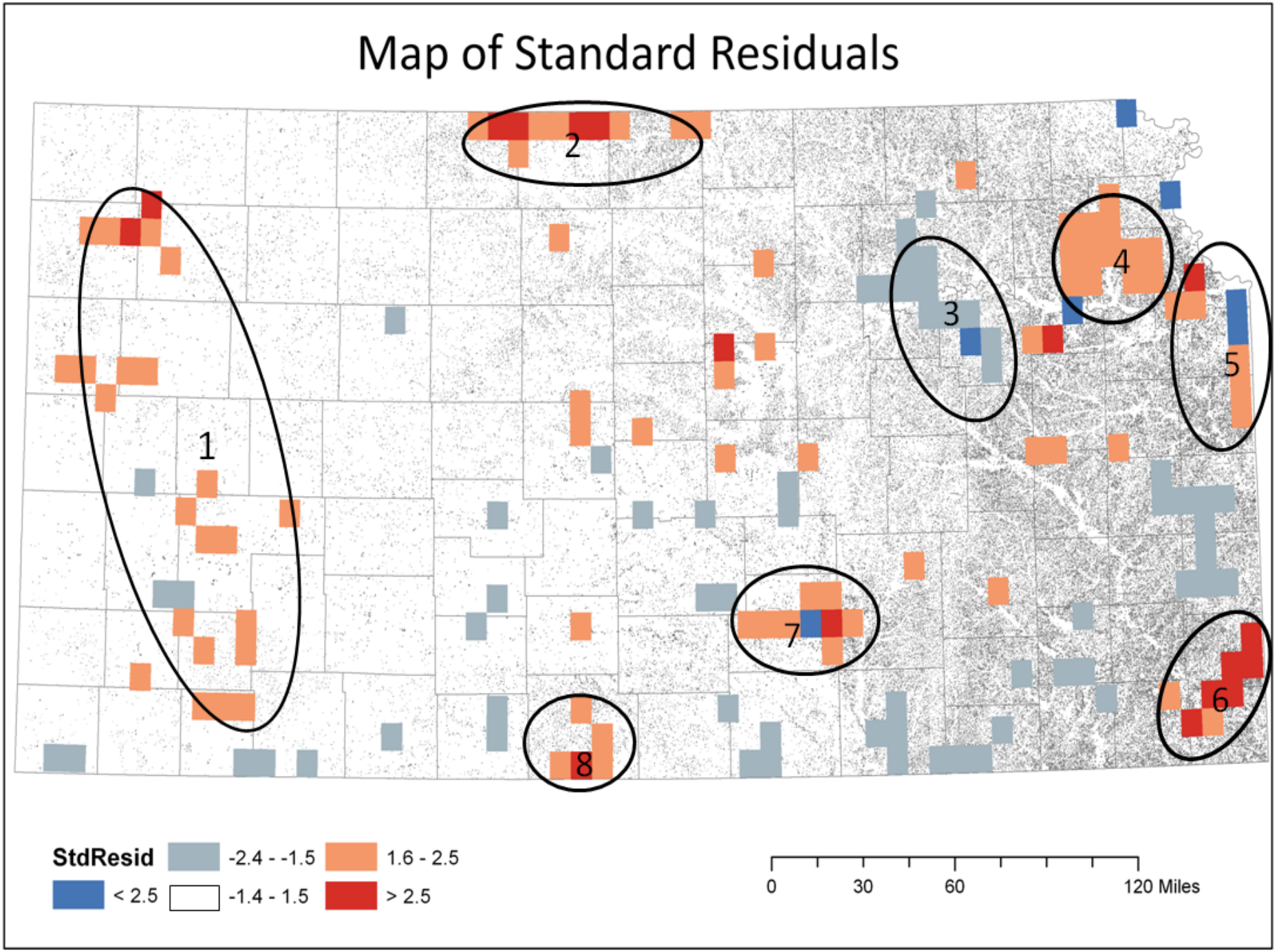
Dependent Variables and GWR Results







GWR Model Results	
AICc	6381.357491
R^2	0.786111
Adjusted R^2	0.784176
Standardized Coefficients (Beta)	
Annual Rainfall	.713
% Grassland	-.133
Population	.126


Map of Standard Residuals
1
2
3
4
5
6
7
8
StdResid
-2.4 - -1.5
1.6 - 2.5
< 2.5
-1.4 - 1.5
> 2.5
0
30
60
120 Miles

Conclusion & Further Research

- **1)**Annual Rainfall, % grassland, and population explain ~78% of the small reservoir variation.
- **2)**Investigating model outliers show several other possible predictors of variation such as cattle density, 'urban-rural fringe', strip mining, and playa associated variables.
- **Next Step:** Represent possible missing spatial variables to create a better model.

Acknowledgements

- Dr. Mark Jakubauskas
- Dr. Terry Slocum
- Paul Liechti
- Natural Resources Conservation Service